

mainly directed to the higher instruction needed to train men for engineering and other employments in Government service or in mines, mills, &c. Valuable work has been done in colleges of engineering and science, and their development is of great importance. But, with a view to the development of Indian industries by native capital for the supply of Indian markets, special technical training must be afforded, resting on the basis of a simple and practical general education acquired in the ordinary schools. In order to provide qualified men for improving Indian industries Government intends to offer scholarships to enable selected students to obtain technical instruction in Europe and America, and it invites the advice and aid of the commercial community in selecting the industries to be studied, in choosing the students, and in turning the knowledge acquired to practical account.

## SOCIETIES AND ACADEMIES.

### LONDON.

**Zoological Society, March 15.**—Dr. Henry Woodward, F.R.S., vice-president, in the chair.—Mr. R. **Lydekker** read a paper on the skull and markings of the quagga, in which he directed attention to vestiges of the face-gland of Hipparion in the skull, and expressed his belief that certain alleged differences in the colour and markings of various specimens of the quagga were due to feeding or to the manner in which such markings came out in photographs. Mr. Lydekker also read a paper on the wild ass of Mongolia, of which an example was in possession of the president at Woburn Abbey, and expressed his opinion that it was the true *Equus hemionus* of Pallas, and distinct from the ass of Tibet and Ladak. The latter he proposed should bear the name *Equus hemionus kiang*.—Mr. R. I. **Pocock** described a new species of spot-nosed monkey, of the genus *Cercopithecus*, from Benin, West Africa.—Mr. F. E. **Beddard**, F.R.S., read the first of a series of papers entitled "Contributions to the Anatomy of the Lacertilia." It dealt with the venous system of *Iguana tuberculata*, *Tiliqua scincoides*, and *Varanus griseus*.—Mr. Percy I. **Lathy** contributed a paper dealing with a collection of butterflies from Dominica, West Indies, of which three were described as new and thirteen had hitherto not been recorded from the island.

**Faraday Society, March 21.**—Dr. O. J. Steinhart in the chair.—On the electrolytic analysis of gold: F. M. **Perkin** and W. C. **Prebble**. The object of the researches described was to arrive at an electrolytic method of estimating gold which should be perfectly accurate and yet far more rapid than the ordinary double cyanide method. Solutions of sodium thiosulphate, of cyanide, of sodium sulphide, of potassium thiocyanate and of ammonium thiocyanate were all tried and the results compared. The first named was useless; of the others—which are all accurate—the thiocyanates gave the best results, and the ammonium salt was better than the potassium. With currents of 0.2 amp. per sq. cm. the deposition of 0.05–0.08 gm. of gold was complete in 5 or 6 hours. With a current of 0.4–0.5 amp.  $\frac{1}{2}$  to 2 hours sufficed.—Thin-film electrolysis, and a proposed application to printing: C. R. **Darling**. While investigating a process for letterpress printing by electrolysis without the use of ink—an extension of Bain's well known telegraphic printing—the author found that the final results of electrolysis, when the electrolyte forms only a thin film, often differ materially from those observed in an ordinary cell. In these experiments a carbon or metal plate (it was immaterial which) formed the anode; on this was placed a 1 impression pad, consisting of some sheets of moist blotting-paper, upon this was the trial sheet, carrying the electrolyte film, and on this the cathode type or coin. The first experiments were made with saline solutions; silver nitrate gave a clear, permanent black image of the type, but the paper, of course, darkens on exposure; copper sulphate and nitrate yielded images that faded after a time; the same unexpected result occurred with lead, mercury salts and bismuth. The best images were obtained with manganese salts.

**Physical Society, March 25.**—Dr. R. T. Glazebrook, F.R.S., president, in the chair.—Note on the measurement of small inductances and capacities and on a standard of

small inductance: Prof. **Fleming**. The author referred to a paper read before the society last year by Mr. W. C. Clinton and himself, in which a motor-driven commutator was employed to measure small inductances. It had since been found that very good results could be obtained in the measurement of small inductances by Prof. Anderson's method by using a telephone in place of a galvanometer and a buzzer in the battery circuit. The author had found that for long solenoids, at least 50 diameters long, the inductance could be calculated with an accuracy of about 1 per cent. by the rule:—Inductance in cm. = (length of wire in one unit length of solenoid)  $\times$  (total length of wire in the whole solenoid in cm.).—A hot-wire ammeter for measuring very small alternating currents: Prof. **Fleming**. The author said that in alternating current work, particularly in taking the power factor of small transformers and of short lengths of cables, the need had been felt for an ammeter not involving the use of iron capable of measuring currents as small as 0.01 or less of an ampere. He exhibited an ammeter capable of being made to read currents as small as 0.002 with fair accuracy. The arrangement was as follows:—Two very fine platinoïd or constantin wires, about 1 metre long and 0.05 or even 0.02 mm. diameter, are supported on a wooden rod with arrangements for adjusting their tensions. These wires are 5 mm. apart, and are held down at the centre by delicate spiral springs. The two wires are embraced at the middle by a small loop of paper carrying a very small plane mirror. These wires are enclosed in a box, the lid of which carries a lens. By this means the light of a straight carbon filament of a glow-lamp, or of a slit illuminated by an arc lamp reflected by this small mirror can be focused on a screen of ground glass. If a current is passed through one of these wires it sags down slightly, and the square root of the displacement of the image on the screen is almost exactly proportional to the current passing.—Dr. W. **Watson** exhibited and described a form of ammeter for small alternating currents. The current to be measured flows through a piece of iron wire bent into the form of a right angle. This is linked with a similarly shaped piece of nickel wire forming part of a galvanometer circuit. The thermo-E.M.F. at the junction, produced by the heating effect of the current, sends a current through the galvanometer which can be measured in the usual way. The current to be measured is practically proportional to the deflection of the galvanometer.—Energy of secondary Röntgen radiation: C. G. **Barkla**. To measure the intensity of radiation electroscopes were placed in a primary beam of Röntgen rays and in a secondary beam proceeding from air in a direction perpendicular to that of propagation of the primary rays. By comparison of the two rates of leak when no absorbing plates were used and when similar aluminium plates were placed before each electroscope, it was found that the absorbability of the secondary rays differed from that of the primary by less than 5 per cent. of its value. It was, however, found that a secondary beam of the same intensity as the primary would produce a slightly different number of ions in a given volume of air, consequently the radiations differ slightly in character. The difference in what may be called the "ionising powers" was evidently greater when the primary beam consisted of more penetrating rays. The fraction of energy lost in secondary radiation was very nearly, if not entirely, independent of the character of the primary radiation. The law which the author had previously found to govern the intensity of radiation from gases was found to be equally applicable to those light solids which are the source of a radiation differing little in character from the primary, i.e. the energy of secondary radiation from these substances situated in a beam of definite intensity is proportional to the quantity of matter through which the primary beam passes.

### PARIS.

**Academy of Sciences, March 28.**—M. Mascart in the chair.—On the physical constants of some fluorides of phosphorus: Henri **Moissan**. Phosphorus trifluoride, pentafluoride, and oxyfluoride were liquefied after careful purification, and their melting points and boiling points determined by means of an iron-constant in thermo-couple.—On the production of quartziferous rocks in the course of the eruption of Mont Pelée: A. **Lacroix**. From an extended series of observations on Mont Pelée, the conclusion is drawn

that the crystallisation of quartz in a volcanic magma does not necessarily require a great depth, and that the conditions regarding pressure, apparently indispensable for the mineralising action of steam, may be realised near the surface, as in the dome of Mont Pelée.—M. Guichard was elected a correspondent for the section of geometry in the place of M. Lipschitz.—On the possibility of showing, by a contrast phenomenon, the objective action of the  $n$ -rays on luminous calcium sulphide: J. Macé de Lépinay. M. Blondlot has shown that whilst the luminosity of the phosphorescent surface when the rays strike it at nearly normal incidence is increased, it is diminished when the angle of incidence is very oblique. Advantage is taken of this, two screens being arranged, the one vertical and the other nearly horizontal, the intensity and angle being adjusted so that in the absence of the  $n$ -rays the two appear exactly alike. Under the influence of the rays, the one increases and the other decreases in luminous intensity, the contrast of the two rendering the effect more striking.—On the applications of the diastoloscope to the study of the displacements of luminous objects: C. Chabrie. On osmosis, a reply to M. A. Ponsot: A. Guillemin.—The factors of equilibrium, capillary pressure and gravity: A. Ponsot. Some applications of the phase rule.—On the properties of curves representing indifferent states: A. Ariès.—On the coagulation of colloidal solutions: Jacques Duclaux.—The separation of chromium and vanadium: Paul Nicolardot. The separation is effected by the formation of chlorochromic acid by the action of fuming sulphuric acid in the presence of a chloride.—The preparation of ether oxides by means of magnesium compounds and halogen methyl ethers,  $\text{XCH}_2\text{OR}$ : l'Abbé J. Hamonet. Bromo-methyl ethers are readily acted upon by alkyl-magnesium compounds, giving higher homologues of the ethers. Methyl benzyl, amyl propyl, and phenyl-ethyl methyl ethers have been prepared in this way, the yields being very good.—On nitrogen phosphorus bases of the type  $(\text{RNH})_3\text{P.NC}_6\text{H}_5$ : P. Lemoult.—The application of acetylene gas to the heating of an incubator by means of an automatic temperature regulator: H. Joffrin.—New observations on the diastatic formation of amylocellulose: A. Fernbach and J. Wolff.—Cephalisation in the annelids and the question of metamorphism: A. Malaquin.—On the morphology of the trypanoplasma of *Phoxinus laevis*: Louis Léger.—The subterranean fauna of the caves of Padirac: Armand Viré.—The endophytic fungus of orchids: Noel Bernard. In a previous paper the author has shown that a fungus is necessary in the fertilisation of a particular species of orchid, and an endophytic fungus, morphologically identical, has now been isolated from other species of orchids of diverse origin.—On the earthquakes of Roumania and Bessarabia: F. de Montessus de Ballore.—The emission of the  $n$ -rays in phenomena of inhibition: Augustin Charpentier and Edouard Meyer.—On the origin of lactose. Experimental researches on the ablation of the mammary glands: Ch. Porcher.—The resistance of rats to arsenical poisoning: F. Bordan. Rats can support doses of arsenic three times greater than those recognised as being fatal to man. They are more susceptible to small daily doses.—The action of formic acid on the organism: L. Garrigue.

## DIARY OF SOCIETIES.

THURSDAY, APRIL 7.

LINNEAN SOCIETY, at 8.—The Morphology and Anatomy of the Stem of the Genus *Lycopodium*: C. E. Jones.

RÖNTGEN SOCIETY, at 8.30.—Exhibition Evening.

FRIDAY, APRIL 8.

GEOLOGISTS' ASSOCIATION, at 8.—On the Metamorphism of Sediments: G. Barrow.

MALACOLOGICAL SOCIETY, at 8.—Description of apparently New Species of *Corbicula*, *Melania*, *Vivipara* and *Lagochilus* from Java: Rev. R. Ashington Bullen.—The Hawaiian species of *Opeas*: E. R. Sykes.—On some Non-marine Hawaiian Mollusca: C. F. Ancey.—Description of a New Species of *Amnicula* from New Zealand: Rev. W. H. Webster.—Report on a Small Collection of Helicoids from British New Guinea, with Description of a New Species: G. K. Gude.

ROYAL ASTRONOMICAL SOCIETY, at 5.—Milky Way Charts of the Heavens on Argelander's Scale  $r''=20\text{mm.}$ ; with Description of the Lenses and Mounting by H. Dennis Taylor and Alfred Taylor: J. Franklin Adams.—Observations of the Minor Planet (324) Bamberga at Windsor, N. S. Wales: John Tebbutt.—Corrected Continuation of Brünnow's "Tafeln der Flora": A. M. W. Downing.—Note on Elliptic Motion: Asaph Hall.—The Roudon Variable Star Observations: H. H. Turner.—Measures of the Double Stars in Struve's "Mensurae Micrometricae," collected and discussed: Thomas Lewis.

MONDAY, APRIL 11.

SOCIETY OF CHEMICAL INDUSTRY, at 8.—The Volatilisation of Lead Oxide from Lead Glazes into the Atmosphere of a China Glast Sagger and its Effect upon the Leadless Glaze Ware in the same Sagger: W. Thomason.—The Preparation of Lead Glazes of Low Solubility and some Points to be Observed in the Process: W. A. Thomason.—The Action of certain Solutions upon Aluminium and Zinc: Watson Smith.

ARISTOTELIAN SOCIETY, at 8.—The Emotional Origin and the Assumed Objectivity of Moral Judgments: Dr. Edward Westermarck.

VICTORIA INSTITUTE, at 4.30.—The Conception of the Great Reality: T. Klein.

TUESDAY, APRIL 12.

ROYAL INSTITUTION, at 5.—The Transformation of Animals: Prof. L. C. Miall, F.R.S.

INSTITUTION OF CIVIL ENGINEERS, at 8.—Recent Developments in Cargo and Intermediate Steamers: Edwin W. de Russett.

WEDNESDAY, APRIL 13.

SOCIETY OF PUBLIC ANALYSTS, at 8.—The Microscopic Examination of Metals (Illustrated by Lantern Slides): J. H. B. Jenkins and D. G. Riddick.—Cod Liver Oil and other Fish Oils: J. F. Liverseege.—Note on Mushroom Ketchup: J. F. Liverseege.

GEOLOGICAL SOCIETY, at 8.—On the Discovery of Human Remains beneath the Stalagmite Floor of Gough's Cavern, near Cheddar: H. N. Davies.—The History of Volcanic Action in the Phlegrean Fields: Prof. Giuseppe de Lorenzo.

THURSDAY, APRIL 14.

ROYAL INSTITUTION, at 5.—Dissociation: Prof. Dewar, F.R.S.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Direct Reading Measuring Instruments for Switchboard Use: K. Edgcombe and F. Punga. (Continuation of discussion.)—Eddy Currents and Eddy Current Losses in Cable Sheaths: M. B. Field.

MATHEMATICAL SOCIETY, at 5.30.—On a Plane Quintic Curve: Dr. F. Morley.—Mathematical Analysis of Wave-propagation in Isotropic Space of  $p$  Dimensions: H. T. Havelock.—On Functions Generated by Linear Difference Equations of the First Order: Rev. E. W. Barnes.—Note in Addition to a Former Paper on Conditionally Convergent Multiple Series: G. H. Hardy.—Spherical Curves. Part II: H. Hilton.—Perpetuant Syzygies of Degree Four: P. W. Wood.—Transformations of the function  $F(\alpha) [\beta] [\gamma] x$ : Rev. F. H. Jackson.

FRIDAY, APRIL 15.

ROYAL INSTITUTION, at 9.—Korea and the Koreans: Rt. Rev. Msgr. the Count Vay de Vaya and Luskod.

INSTITUTION OF MECHANICAL ENGINEERS, at 8.—Discussion: Compound Locomotives in France: M. Edouard Sauvage.

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